employer not have the benefit of the best medical advice in running his business?

The surgeon seeing an industrial case after treatment has been carried on for some time, fully appreciates the necessity for the employment of the best methods in the initial care of the injury. A deformity may have become fixed, a faulty posture made habitual, the patient's mental attitude distorted, or the real injury passed unrecognized.

Too complete shifting from rigid fixation or support to over activity or non-support, should be supplemented by gradual removal of plaster jacket or brace and graduated physio-therapeutic measures for restoration of function of the involved part. Attention should be given to the importance of correcting the faulty postural habits. Less emphasis should be placed on spinal anomalies,—especially from the patient's standpoint—when they have no bearing on the treatment of the injury. Mental occupation must not be overlooked. Neither should the patient be returned to his former occupation at the end of treatment unless physically able to perform his duties but rather given such work that will not renew his disability. His employer should be informed of the medical recommendation to that effect. Braces or other apparatus to be worn must be useful not impedimentary. When the application of braces is more closely supervised by the surgeon ordering them and less leeway allowed the brace maker, such braces will serve better the purposes intended and be worn more advantageously by the patient.

In a general consideration, injuries affecting the soft tissues are more common, present a greater range of severity, are of less duration and are generally curable. The difficulty in determining the full extent of the injury should stimulate the examining surgeon to his best efforts in effecting a rapid cure. These are the cases that improve slowly unless efficiently managed, have recurrences, develop arthritic conditions and become functionally chronically disabled. Immediate effectual treatment usually produces a cure.

The bone injury group of cases are fewer in number, more disabling at onset, of longer duration, and frequently are permanent. A correct diagnosis is made more readily. Possibly on account of the rather complete immobilization, less arthritic changes occur. Restoration of function is often neglected and delayed because attention is focused on bone repair. A wise use of physio-therapy, such as occupational or mechanico-therapy, is of much value in preserving and improving bodily functioning, and thereby decreases the period of disability and lessens ultimate disabled state.

Anatomical variations, especially common in the lower portion of the spinal column, most frequently complicate the treatment of injuries of the type under discussion. It is essential, in determining the influence these malformations may have on the injury, to be familiar with the normal or near-normal anatomical relations of the parts involved. The value of exhaustive X-ray examinations is most illuminating. Judgment, however, in the interpretation of such findings, must be clear and unbiased. The advisability of treating these complications, necessitating prolonged and expensive hospital care, surgery, apparatus, and a doubtful prognosis, must be thoughtfully considered from the industrial standpoint, and should not be undertaken unless absolutely indicated in the proper treatment of the case.

Osteoarthritis too often complicates prolonged or poorly treated cases. Much relief is obtained and the arthritis arrested by thorough elimination of the infectious foci and intensive physio-therapeutic measures. Early attention to this unavoidable element certainly lessens the ultimate disability.

Functional neuroses appear late as a complication. Every surgeon knows the difficulty in obtaining reasonable results when this condition becomes evident. The best efforts of the surgeon may be frustrated in treating such a case. A money settlement usually "cures" the patient. Efficient early treatment practically eliminates this condition.

It is the purpose of this paper to bring to your attention the importance of correct diagnosis and the advantages of early instituting the most efficient measures in the treatment of industrial disabilities involving the spinal column.

DELAYED ULNAR PALSY FOLLOWING ELBOW INJURY.*

By WALTER F. SCHALLER, M. D., San Francisco.

Recently there has come under our observation a number of cases of unilateral ulnar nerve palsy, due to elbow injuries antedating the oncoming of paralysis by an appreciable interval of time. These cases, at first obscure as to etiology, we have now come to recognize as the delayed type of ulnar palsy following bone injuries involving the region of the internal condyle and causing subsequent pathology in the ulnar nerve in this locality. The striking feature in this type is the long symptom-free interval. Four case histories follow:

Case No. I. Summary: Twenty year interval between injury to elbow and first symptoms of ulnar palsy. Condition thought to be possibly a postural neuritis or beginning amyotrophic lateral sclerosis. Radiographs showed displacement of lower fragment of humerus with new growth of bone in the neighborhood of the trochlear surface. At operation a spindle-shaped neuroma was found at epitrochlea. Neuroma split; a new bed formed for nerve in front of epitrochlea, and protected by a fascia-fat flap. Considerably improved when seen fourteen months later.

R. M. Aged 31. Female. First seen in November, 1915. Patient gave a history of fracture of the right arm at the age of seven. Dating from this injury the elbow has shown some deformity. It is seen that there is slight limitation in flexion with cubitus varus. Other than this deformity no complaint until four years ago, when a numbness was felt first on the ulnar side of the hand and fingers, followed two years later by a weakness of the hand muscles, evidenced by buttoning shoes, using clothes-pins, tucking in bed-clothes and making beds, etc. It was sus-

* Read before the Forty-ninth Annual Meeting of the Medical Society, State of California, Santa Barbara, May, 1920.

pected by other physicians who had examined this patient that the condition was one of postural neuritis, for patient gave a history of sleeping on the right arm with the result that this arm "goes to sleep" frequently at night. An examination revealed a hypoesthesia over the distribution of the ulnar nerve in the hand and fingers; atrophy of the hypothenar eminence and the interossei muscles was quite marked. The electrical reactions in the small hand muscles innervated by the ulnar nerve were found to show incomplete reaction of degeneration. The ulnar nerve at the internal condyle was enlarged giving the impression of a large lymphatic gland. The nerve was tender. It responded to electrical stimulation. A careful search for disturbance of motor and sensory function above the wrist showed nothing remarkable. The tendon reflexes were quite lively on both sides, and a note in the case history calls attention to the possibility of a beginning amyotrophic lateral sclerosis. X-rays of the elbow showed a considerable degree of displacement of the lower fragment of the humerus with more or less new growth of bone in the neighborhood of the trochlear surface. Flexion of the elbow lifted the ulnar nerve completely out of its groove under the internal condyle.

On January 11, 1916, Dr. Emmet Rixford exposed the ulnar nerve at the elbow. At the epitrochlea was found a spindle-shaped neuroma about twice the diameter of the nerve; below this point the nerve was thin and soft. It was decided best to split the neuroma longitudinally in several planes rather than excise it and re-suture the nerve. After this was done the nerve was lifted forward over the anterior surface of the epitrochlea and by section of a few fibers of the flexor carpi ulnaris muscle near its insertion the nerve was put in a less exposed position, with a flap of fascia and fat for protection, and the wound closed. When seen again, on March 21, 1917, the patient stated that there was no longer numbness in the hand, and that the muscular power had considerably improved. Clinically the hand showed none of the evidences of ulnar palsy.

Case No. II. Summary: Complaint of weakness of the hand muscle five months after having received an apparently trivial injury to elbow while wrestling. Radiograph revealed chipping of internal condyle. At operation nerve was found to be enlarged by fusiform swellings. Joint-mouse in bursa below nerve. Fusiform swelling slit; bursa and joint-mouse removed; replacement of nerve. Considerable improvement after operation.

I. T. Aged 33. Professional wrestler. First seen in February, 1916. Eight months before while wrestling fell on left arm with hand and forearm in supination. Although he suffered some pain he continued with his exercise, did not consult a physician, and the only disability which he noticed afterward was that he could not place the left hand back of his neck without pain at the elbow. Three months ago first noticed a weakness in the left hand and also a wasting of the left hand muscles. Examination revealed a wasted hypothenar eminence, the interossei were quite weak as shown by the functional tests. Sensory examination revealed a hypoesthesia in the ulnar distribution in the hand and fingers, but the epicritic sensibility was conserved. The electrical reactions showed reaction of degeneration in the hypothenar group of muscles and the interossei, and the ulnar nerve at the elbow did not act to either the faradic or galvanic current. The ulnar nerve could be felt to slip out of its groove in flexion, and the nerve was quite sensitive on pressure. Radiographs showed small bones with indefinite epicondyles,—the inner being notably small; below it were two minute bits of bone, which possibly were torn off by muscular effort.

On February 26, Dr. Emmet Rixford exposed the ulnar nerve at the elbow, which was found to contain several fusiform swellings in the individual divisions of the nerve. Two of these swellings were slit, but no encapsulation was present to permit of an enucleation of any neuroma. When the nerve was lifted out of its groove a typical joint-mouse was felt in the bursa, and this was opened and the joint-mouse removed, and finally the entire bursa was removed. The sheath of the nerve was reunited, the nerve replaced in its groove, and the fascias over it closed. On November 27, 1916, patient reported that the paralysis was much less. The ulnar hand muscles and the interossei had regained much of their volume, and the hand tests showed considerable improvement in function.

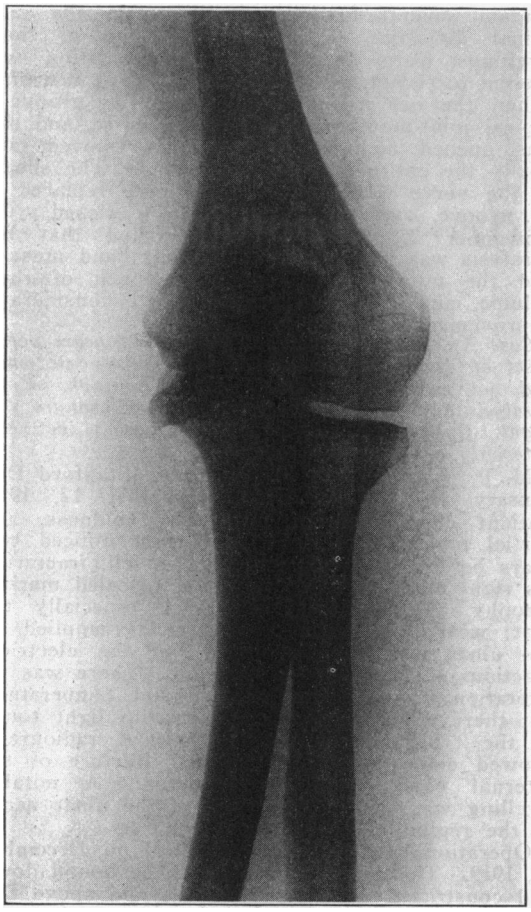
Case No. III. Summary: Twenty-eight years before onset of symptoms fracture of internal condyle which had not united, as seen in the radiograph. Motor paralysis quite marked, objective sensory changes very slight. Operative treatment by transposing the nerve anteriorly and suturing condyle.

M. P. Male. Aged 40. Laborer. Stanford Dispensary No. 80142. Seen November 12, 1919. Patient complained of numbness, coldness, and partial paralysis of right hand, first noticed two years before. Thirty years ago he fell, fracturing his right elbow. An examination revealed marked atrophy of the dorsal interossei, especially the first; weakness of the other muscles supplied by the ulnar nerve in the hand, but the electrical reactions showed no degeneration. There was no alteration in perception to pain and temperature, but there were areas of anesthesia to light touch in the typical ulnar distribution. A radiograph showed evidence of old ununited fracture of the internal condyle of the humerus. A notable swelling was felt in the trunk of the ulnar nerve at the region of the internal condyle.

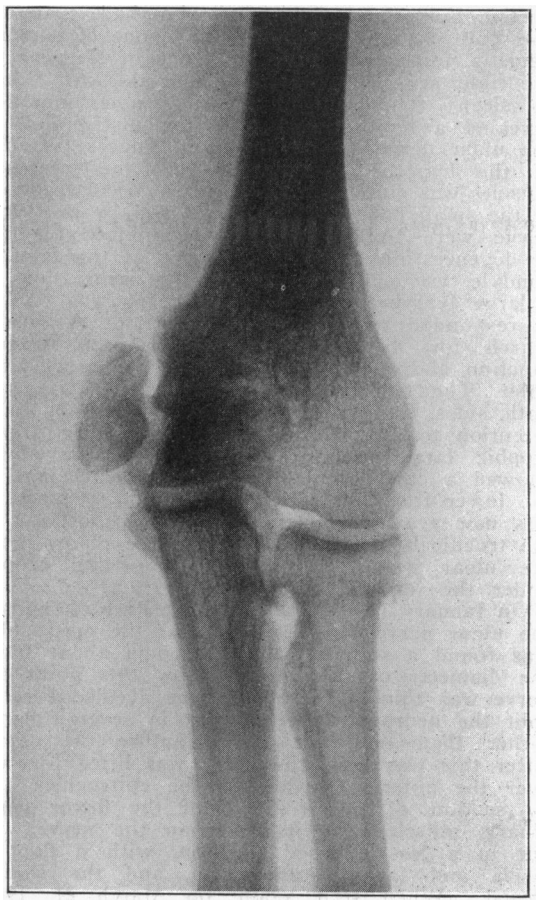
Operation by Dr. Emmet Rixford on December 13, 1919. The nerve was found to be bound down and constricted with fibrous tissue and above this constriction slight but soft enlargement of nerve; below constriction nerve much softer than normal and noticeably smaller. The epitrochlea was cut away, retaining attachments of flexor muscles; cartilage and fibrous tissue were cut away from the opposing end of the humerus; the bone was smoothed, and the epitrochlea was attached with wire mattress sutures. The nerve was replaced in front of the joint and the arm put up in a right angle splint. A note on February 18 states that there appeared to be some sensory improvement in the hand. The motor disability and atrophy had not changed perceptibly although patient had been receiving electrical treatments in the interval.

Case No. IV. Summary: Seventeen year interval between extensive elbow joint injury and commencement of ulnar neuritis causing more motor than sensory paralysis. Complete reaction of degeneration. Operative treatment by dislocating the nerve interiorly in front of internal condyle.

A. R. H. Male. Aged 30. Was seen on December 8, 1919, referred by Dr. Leo Eloesser for electrical examination. At the age of eight he injured the right elbow, with following considerable deformity and loss of motion in the joint. Five years ago he noticed a beginning weakness and numbness in the hand, especially on the inner side, and this condition has grown progressively worse. If he flexed the elbow during sleep he was awakened by pain. An examination showed typical motor and sensory paralysis in the ulnar distribution in the hand, the sensory changes being in the nature of a hypoesthesia, most marked to temperature but quite marked for pain, and to a less degree to touch. There was marked atrophy of the interossei, hypothenar group, and adductor of thumb. The electrical reactions showed complete reaction of degeneration in the ulnar hand muscles. The radiograph showed fracture of the external condyle of the humerus with wide separation of the fragments; there was also disloca-



Case I. Displacement of Lower Fragment of Humerus with New Growth of Bone in the Neighborhood of the Trochlear Surface



Case III. Old Ununited Fracture of Internal Condyle

tion of the head of the radius. The deformity consisted of an old fracture dislocation of right elbow with 55 degrees varus angulation and a projection over internal condyle.

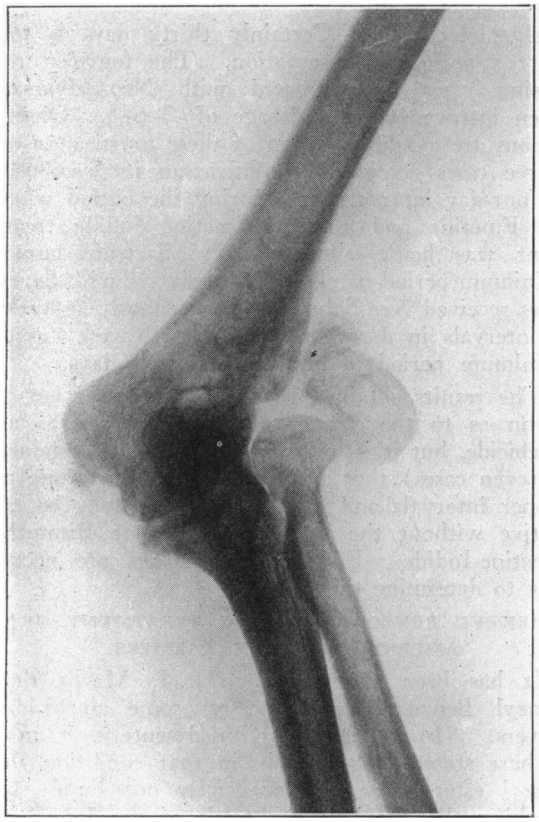
On December 8, 1919, Dr. Eloesser exposed the nerve at the elbow. His operative notes follow:

"Ether anesthesia. Esmarch bandage, removed after exposure of nerve, remaining in place ½ hour. Nerve exposed through 8-inch incision, 5 inches above and 3 below elbow. Above the elbow there is a network of engorged veins surrounding the nerve outside of the sheath as far as it can be exposed. The sheath, for a distance of 3 or 4 inches both above and below the elbow, is adherent with old but widely separated perineural adhesions to the surrounding muscle and underlying periosteum. Where it crosses the broad condylar notch it is two to three times as thick as normal, red, somewhat gelatinous, and is the seat of a spindle-shaped swelling about two inches in length. The part of this swelling lying nearest the internal condyle, i. e., the internal anterior quadrant of the nerve, is harder than the rest of the nerve. The nerve is freed through the place where it dives between the two heads of the ulnar carpal flexor. It is swollen as far down as it is exposed. The nerve is lifted up from its bed and dislocated, being placed anteriorly in front of the internal condyle. It is held in this place by severing the internal head of the ulnar carpal flexor from its attachment to the ulna, passing the nerve underneath it, and stitching the head of the muscle back into place. The subcutaneous fat is tacked with 2-3 catgut stitches to the superficial fascia, holding the nerve loosely above the elbow. Wound closed without drainage."

The patient was seen last on January 30, 1920, when the condition was very little altered in the affected hand.

The most important recent article on this condition was written by J. Ramsay Hunt, reporting three personal cases. He emphasizes the long period of latency—in one case thirty-five years. The first description was recorded by Panas. Sherren made histological studies of excised portions of the diseased nerve in two cases and considers the pathology due to an interstitial neuritis, with irregular areas of sclerosis in the perineurium and endoneurium. It will be seen in the above case reports that clinically a glioma was suspected and thought to be found on operative exploration. One of Hunt's cases (Case 3) was very similar to Case 2 of our series in that a firm cystic tumor was found beneath the ulnar nerve compressing it and pushing it forward. The tumor was apparently a hernia from the joint synovial membrane which had been constricted. In this case recovery was complete. Whatever be the pathologic condition of the nerve, the long mechanical and irritating factors in its causation are evident.

In the differential diagnosis, aside from the ordinary neuritis and its common etiological factors, several affections must be emphasized. These are: Amyotrophic lateral sclerosis, ordinary pressure palsy, and Hunt's hypothenar type of neural hand atrophy. Neel reports a case in which the atrophy was ascribed to an intraspinous process acting on the spinal cord, and a futile laminectomy was



Case IV. Old Fracture of the External Condyle of the Humerus with Wide Separation of Fragments; Dislocation of Head of Radius

done. One of Hunt's cases was diagnosed as progressive muscular atrophy by several neurologists of wide experience and training. John B. Murphy reports a case in which a prognosis was based on the electrical reactions. An abstract of Murphy's case history follows:

"A man aged thirty years injured his left elbow when four years of age. He complained of pain in the arm, weakness, and wasting of some of his hand muscles. Examination revealed the interossei and lumbricales atrophied; also muscles of the hypothenar eminence and the adductor of the thumb. A skiagram showed evidence of an old fracture, with non-union of the external condyle. The ulnar nerve was exposed, found to be about three times its normal size, the seat of a neuroma. Transmission through the neuroma was found by stimulation by the faradic current after the nerve was freed. This was interpreted to mean that connective tissue compression of the axons of the nerve prevented transmission of nerve impulses and function. The nerve was transplanted in front of the condyle, with a good prognosis for restoration of function after the nerve was protected from injury by a fat and fascia flap placed beneath it."

The treatment is essentially surgical, the surgical indications being different in the individual case. From my own observations I believe that conservative treatment should be the rule, especially as regards excision of the neuroma-like swellings. Protecting the nerve from irritation by forming a new bed in front of the internal condyle seems a logical procedure. The operation of Mouchet, which according to Hunt is the one of choice in certain cases, consists of a supracondyloid cuneiform osteotomy, connected with a deepened and enlarged ulnar groove in which the nerve rests. Freeing the nerve from adhesions, removing joint-mouse when present, and splitting the nerve, have been done. The prognosis of course depends on the amount of connective tissue formation in the nerve. When this is present in a marked degree complete restoration of function cannot be expected.

Bibliography.

Hunt, J. Ramsay: Tardy or Late Paralysis of the Ulnar Nerve. J. A. M. A., 42: 11, 196.

————: The Thenar and Hypothenar Types of Neural Atrophy of the Hand. Am. Jour. Med. Sc., Feb., 1911.

Sherren: Chronic Neuritis of the Ulnar Nerve due to Deformity in the Region of the Elbow Joint. Edinburg Med. Jour., 23: 500, 1908.

Mouchet: Paralyse tardive du nerf cubital a la suite des fractures du condyle interne de l'humerus. Jour. de Chir., 12: 437, 1914.

Murphy: Neuroma of Ulnar Nerve, the Result of Trauma Incident to Fracture at the Elbow Joint. Clinics, 3: 375, 1914.

Neel: Ulnar Neuritis after Trauma of Elbow Hospital Stidende, Jan. 15, 1919. Abs. Jour. Nerv. and Ment. Dis., 50: 571, 1919.

THE TREATMENT OF CHRONIC AMEBIC DYSENTERY CYST CARRIERS.*

By CHAS. L. McVEY, M. D., Oakland.

Warrington Yorke in England undertook the work of curing amebic cyst carriers because—

1st. Carriers of amebic dysentery might be the means of infecting others.

2nd. As long as cysts are present carriers may experience a relapse of acute dysentery or hepatic abscess.

Among 4,000 chronic or convalescent dysenterics, cysts were found present in 11.5%. Among 450 cases not suffering from dysentery, 7.8% were positive. Among people who had never been out of England, Yorke found statistics as follows:

548 Children—1.8% infected.
450 Men and Women—1.5%.

Young men of eighteen or nineteen years were found more heavily infected than the civilian population regarded as a whole (5.6%). Families are infected from other members of the family in 68% of cases.

Yorke believed that amebic dysentery existed in England before the war to an extent which was then unrealized. Similar statistics were attained by Matthews and Smith, Baylis, Dobell, in New Zealand, and Wenyon and O'Connor in Egypt. The work of Kofoid, Kornhauser and Plate in the United States has shown an incidence of 3% infection in Home Service Troops and 10.8% in Overseas Troops.

It would seem from the above facts that the treatment of chronic amebic cyst carriers is a public health problem of considerable importance.

Many drugs have been recommended as possessing amebicidal power. Among them may be mentioned Quinine, Chaparro Amargosa, Oxygen, Oil of Chenopodium, Ipecac, Emetine, Bismuth-Emetine Iodide, Salvarsan and Neo-Salvarsan, and lately Benzyl Benzoate. Emetine became very popular following the discovery of Vedder in 1912 that emetine killed ameba in a dilution of 1 to 100,000. Later Rogers in India reported fa-

* Read before the Forty-ninth Annual Meeting of the Medical Society of the State of California, Santa Barbara, May, 1920.